SOCIETIES AND ACADEMIES

London

Royal Society, April 22.—"Effects of Electric Currents on the Surfaces of Mutual Contact of Aqueous Solutions." By G. Gore, LL.D., F.R.S.

In the year 1859 I made the following experiments, for the purpose of ascertaining whether visible movements, similar to those obtained by passing an electric current through mercury and an aqueous solution, could be obtained by passing a current through the surface of mutual contact of two aqueous liquids alone:—"1. A definite layer of oil of vitriol was placed beneath a layer of distilled water weakly acidulated with sulphuric acid, and the terminal wires of a voltaic battery immersed in the upper liquid; no visible movements occurred at the boundary line of the two liquids.

"2. A dense solution of cyanide of potassium was placed in a small glass beaker, a few particles of charcoal sifted upon its surface, and a layer of aqueous ammonia, half an inch deep, carefully poured upon it. A vertical diaphragm of thin sheet gutta-percha was then fixed so as completely to divide the upper liquid into two equal parts; the vessel was placed in a strong light, and two horizontal platinum wire electrodes, from sixty-six freshly-charged Smee's cells, were immersed one-eighth of an inch deep in the liquid ammonia on each side of the diaphragm. A copious current of electricity circulated, but no movement of the liquids at their mutual boundary line could be detected" (see *Proc. Roy. Soc.*, vol. x., 1860, p. 235, par. 9).

Recently, also, I have made similar experiments, but in a much more searching manner, in order to ascertain whether an electric current, passing between two aqueous liquids, affects their diffusion into each other. The essential difference in the form of these experiments from that of the above-mentioned ones was to concentrate the action of the current upon a very much smaller surface of contact of the liquids, and thus render any visible effect upon their diffusion more manifest.

After making several forms of apparatus, in order to obviate certain difficulties of manipulation which arose and were fatal to success, I found that, when an electric current was passed between the surfaces of mutual contact of certain aqueous solutions of different specific gravities, the boundary line of contact of the two liquids became indefinite at the surface where the current passed from the lighter into the heavier solution, and became sharply defined where the current left the heavier liquid and re-entered the lighter one; and that on reversing the direction of the current several times in succession after suitable intervals of time, these effects were reversed with each such change. Also, in various cases in which the contiguous boundary layers of the two liquids had become mixed, the line of separation of the two solutions became, by the influence of the electric current, as perfect as that between strata of oil and water lying upon each other. In rarer cases two such distinct lines of stratification appeared. Other new phenomena were also observed.

As I have sought, without success, for any record of previous discovery of essentially similar effects, and as it is evident that those I have observed belong to a large class of similar phenomena, I beg leave to take the earliest opportunity of submitting this brief statement to the Royal Society.

"Revision of the Atomic Weight and Valence of Aluminium," by J. W. Mallet, F.R.S.

The general mean from all the experiments, if all be included, is Al = 27·032, with a probable error for this mean of ± ·0045. If Series I, B, be excluded, the mean of all the remaining twenty-five experiments is Al = 27·019, with a probable error of ± ·0030.

The general result adds, the author hopes, aluminium to the, unfortunately still limited, list of those elementary substances whose atomic weights have been determined within the limits of precision attainable with our present means of experiment.

This result also adds one to the cases already on record of the numbers representing carefully determined atomic weights approaching closely to integers, and leads the author to say a word on the reconsideration of "Prout's Law." Taking the following eighteen elements as the only ones of which the atomic weights may be fairly considered as determined, with reference to hydrogen, with the greatest attainable precision, or a near approach thereto, namely, oxygen, nitrogen, chlorine, bromine, iodine, sulphur, potassium, sodium, lithium, silver, thallium, aluminium, carbon, phosphorus, barium, calcium, magnesium, and lead, and making a reasonable allowance for the errors of the determinations, he calculates the probability that nine of those numbers should lie, as they are found to do, within 0·1 of integers, supposing the value of the true numbers to be determined by chance, and finds it only as 1 to 235·2. The exact figure for the chance will of course depend upon the limit of error taken; but the above example seems sufficient to show that not only is Prout's law not as yet absolutely overturned, but that a heavy and apparently increasing weight of probability in its favour, or in favour of some modification of it, exists, and demands consideration.

Chemical Society, April 15.—Prof. H. E. Roscoe, president, in the chair.—The following papers were read,—On the lecture illustration of chemical curves, by E. J. Mills. The author has contrived an apparatus for exhibiting the variations in the actions of sulphuric acid on zinc and sodic hydrate on aluminium, produced by alterations (1) in the strength of the solution, (2) in the time during which the action is allowed to proceed. The gas evolved is collected in a series of inverted glass cylinders filled with water, arranged at equal distances. The surfaces of the water levels after the gas has been collected form a curve.—On the analysis of organic bodies containing nitrogen, by W. H. Perkin (continued). The author finds that a mixture of precipitated manganic oxide and potassium chromate (containing 10 per cent. of bichromate) in about equal parts kept at a temperature of 200°–250° C. is preferable to the chromate alone for absorbing the oxides of nitrogen.—On the volatilisation of solids in vacuo, by W. D. Herman. The author has obtained adamantine colourless transparent crystals of phosphorus by volatilising ordinary phosphorus in vacuous glass tubes in the dark. The crystals may be as long as 8 mm.; they turn red in sunlight. Similar experiments have also been made with sulphur, selenium, &c.—On the determination of nitric acid as nitric oxide by means of its reaction with ferrous chloride, by R. Warington. The author describes an apparatus for the above purpose. The air is expelled by carbon dioxide, the nitrate heated by a calcium chloride bath to 135° C., and the nitric oxide measured as gas; organic matter does not affect the results.—On the six possible isomeric dibromtoluols and other of the bromo- and bromonitro derivatives of toluol related thereto, by R. Nevile and A. Winther. The authors criticise the results of Wrobleosky, *Jahr.*, 1870, 528, and 1871, 450, and establish the conclusion that in such bodies the bromine never occupies a position which is "meta" to the amido group.

Zoological Society, April 20.—Prof. W. H. Flower, F.R.S., president, in the chair.—Prof. Owen, C.B., read descriptions of some new and rare Cephalopoda, to which were added notes on the occurrence of gigantic species of this group.—A second paper was read by Prof. Owen on the external and structural characters of the male of *Spirula australis.*—Dr. M. Watson read a paper on some points in the anatomy of the Proboscidea, in which he described the structure of the female organs of the Indian elephant, as observed in a specimen recently dissected.—Lieut.-Col. H. H. Godwin-Austen read a paper on the land-molluscan genus *Girasia* of Gray, and made remarks on its anatomy and on the form of the "*capreolus*" of Lister or the spermatophore, as developed in species of this genus of Indian Helicidæ.—A communication was read from Dr. Max Schmidt on the duration of life of the animals in the Zoological Garden of Frankfort-on-the-Main.—A communication was read from the Rev. O. P. Cambridge, C.M.Z.S., containing descriptions of new or little-known spiders of the genus *Argyrodes.*—A communication was read from Mr. Edgar A. Smith containing an account of a collection of the shells of Lake Tanganyika, and of the neighbourhood of Ujiji, Central Africa, made by Mr. E. C. Hore, of the London Missionary Society. Twenty-one species were represented in this collection, amongst which were two new generic forms proposed to be called *Tiphobia horei* and *Neodauma tanganyicensis.*

Geological Society, April 14.—Robert Etheridge, F.R.S., president, in the chair. Colville Brown, John N. Dufty, and George Benjamin Nichols were elected Fellows of the Society.—The following communication was read:—On a new Theriodont Reptile (*Cliorhizodon orenburgensis*, Twelvetr.) from the Upper Permian Sandstone of Kargalinsk, near Orenburg, in South-Eastern Russia, by W. H. Twelvetrees, F.L.S. The above measures are cupriferous, and rest on limestone with Zechstein fossils. Associated with the remains of Saurians and Labyrinthodonts are *Calamites*, *Lepidodendron*, *Aroides crassispatha*, Conifers, and a *Unio.* The specimen noticed in this paper is apparently the dentary part of the left mandibular ramus, with the crowns of a canine, an incisor, and ten of the molars. The author describes the characteristics of these and the mode of implantation in the jaw, which accords with that described by Prof Owen in *Titanosuchus ferox*. The characters of this specimen resemble those of the genus *Rhopalodon;* but as there are some marked differences, the author proposes to name it *Cliorhizodon orenburgensis*.—The classification of the Tertiary period by means of the mammalia, by Prof. W. Boyd Dawkins, F.R.S., Professor of Geology in Owens College. The author, after some introductory remarks on the value of vertebrata and invertebrata in classification, pointed out that the mammalia become of especial value in the Tertiary period as undergoing more rapid change than the other classes, from their being, as it is happily termed, *en pleine évolution*. He discussed the characteristics of each of the great periods, as defined and limited by their mammalia, pointing out that throughout the Eocene these frequently exhibit relations more or less marsupial. Indeed it is not till the close of the Lower Miocene that the traces of this relationship are lost. In the Middle Miocene, *Sus*, *Cervus*, *Antilope*, *Felis*, *Lutra*, and *Castor* appear for the first time, and the higher apes were present in European forests. In the Upper Miocene, *Camelopardalis*, *Gazella*, *Hyæna*, and *Hystrix* appear. During the Pliocene several important genera disappear from the world or from Europe—among the latter the apes, at the close of the Upper Pliocene. Oxen, horses, bears, and elephants appear. Great changes took place in the Pleistocene; seven species survived into it which are now extinct, and of new-comers there were fourteen living and seven extinct species. *Cervus megaceros* is the sole survivor from the Pleistocene to the prehistoric period which has since become extinct. The paper concluded with some remarks on the latter part of the first and the second period, which, however, as forming the subject of previous notices, was treated more briefly. The author remarked that a study of the development of the mammalia renders it hopeless to expect to find man in the Eocene or Miocene, and improbable in the Pliocene.

Anthropological Institute, April 13.—Major-General A. Lane Fox, F.R.S., vice-president, in the chair.—The director read a paper on Fijian Burial Customs, by the Rev. Lorimer Fison. There is no uniformity of custom in Fiji, so that no description of what is done by any one tribe can be taken as applicable to all the others. The strangling of widows, however, that they might be buried with their dead husbands, seems to have been everywhere practised. The widow's brother performs the operation, and is thenceforward treated with marked respect by his brother-in-law's kinsfolk, who present him with a piece of land over which the strangling-cord is hung up. Should he, however, fail to strangle his sister, he is despised and ashamed to show his face. When a woman is about to be strangled she is made to kneel down, and the cord (a strip of native cloth) is put round her neck. She is then told to expel her breath as long as possible, and when she can endure no longer to stretch out her hand as a signal, whereupon the cord is tightened, and soon all is over. It is believed that, if this direction be followed insensibility ensues immediately on the tightening of the cord; whereas if inhalation has taken place, there is an interval of suffering. An excuse for the practice of widow-strangling may be found in the fact that according to Fijian belief, it is a needful precautionary measure, for at a certain place on the road to Mbulu (Hades) there lies in wait a terrible god, called Nangga-nangga, who is utterly implacable towards the ghosts of the unmarried. He is especially ruthless towards bachelors, among whom he persists in classing all male ghosts who come to him unaccompanied by their wives. Turning a deaf ear to their protestations, he seizes them, lifts them above his head, and breaks them in two by dashing them down on a projecting rock. Women are let off more easily. If the wife die before her husband, the widower cuts off his beard and puts it under her left armpit. This serves as her certificate of marriage; and, on her producing it to Nangga-nangga, he allows her to pass. On the island of Vanua Levu a noted "brave" is distinguished from the common herd after death by being buried with his right arm sticking out above the grave-mound, and passers-by exclaim with admiration as they look upon the fleshless arm, "O the hand that was the slayer of men!" For some days after the decease of a ruling chief, if his death be known to the people, the wildest anarchy prevails. The idea seems to be that not until decomposition may be supposed to have made considerable progress is the dead man fairly done with, and his authority handed over to his successor. Hence the death of a ruling chief is studiously concealed for a period varying from four to ten days. By many tribes the burial-place of their chief is kept a profound secret, lest those whom he injured during his lifetime should revenge themselves by digging up and insulting, or even eating, his body. Hence the surface sods are raised with extreme care, in order that they may be replaced with as little derangement as possible. Cave burial is common in Fiji, although by no means universal; in some cases artificial caves are made, either in the side of a hill, or by sinking a perpendicular shaft, and then putting in a "side drive," as the Australian gold-diggers call it; this forms the grave, and here the chief lies with his strangled women under him. A stone closes the entrance of the chamber and excludes the earth when the shaft is filled up. On the death of the king of the Nakelo tribe three old men come, with fans in their hands, and conduct the spirit to the banks of the river. Here they call upon Themba—the Nakelo Charon—to bring over his canoe, and wait until they see a wave rolling in towards the shore, which they say is caused by the approach of the invisible canoe; they then avert their faces, point their fans suddenly to the river, cry aloud, "Go on board, sir," and forthwith run for their lives, for no eye of living man may look upon the embarkation. The grave is dug about hip deep, the body laid in it, and an old cocoanut is broken by a blow with a stone, being so held that the milk runs down upon the head of the corpse. The meat of the nut is then eaten by the three elders, and the grave is filled up.—A paper on the Polynesian Race, by C. Staniland Wake, M.A.I., was read. The author proposed to show, first, that the Polynesian Islanders must be described as a bearded rather than a non-bearded race, and secondly, that, as a rule, they are well acquainted with the use of the bow and arrow, and quoted the observations of numerous travellers in support of his view.—Major-General A. Lane Fox, F.R.S., exhibited some paintings and bead mats, the work of Bushmen.

Physical Society, April 24.—Prof. W. G. Adams in the chair.—New members:—The Marquis of Blandford, Mr. J. Marshall.—Prof. G. C. Foster read a note by Prof. Rowland, of Baltimore, U.S., on the discovery of Mr. Hall that a magnet exercises an electromotive on a current in a conductor crossing its field, as well as a force on the conductor itself. This fact will render it necessary to apply a correction to equations which assume that only the latter force acts. The electromotive force in question is at right angles to the direction of the current and to the lines of magnetic force. Prof. Rowland expresses it mathematically in this note, and bases a new method of determining the value of v, the ratio of the electrostatic to the electromagnetic unit of electricity, which gives v almost identical with the velocity of light, thus confirming Clerk-Maxwell's theory of the nature of light. Dr. J. Hopkinson, F.R.S., suggested an expression for one of Prof. Rowland's results.—Prof. Foster also read a note by Prof. Wild, of the Central Russian Meteorological Observatory, on a mode of correcting the bifilar magnetometer for torsion of its fibres, &c., and a method for finding the horizontal component of the earth's magnetism by its aid.—Mr. Ridout, F.C.S., described an improved thermo electric apparatus of his construction. The author has followed the idea of combining the thermopile and galvanometer in one instrument on the same base-board. The defects of the apparatus as ordinarily made are a too great disparity between the resistance in the pile and in the galvanometer; the junctions of the pile are too deep, and short-circuit the current; the bars too long and resisting, as well as too numerous; the junctions too slender; the mass of matter to be heated too great. These defects are remedied by placing the bars in glass tubes connected with these plates of copper; making the bars half the usual length, and using only a single pair. The defects in the galvanometer are that the wire does not come near the needle; the needles are not of the best form, and the suspension is troublesome. Mr. Ridout makes the wire a flat ribbon mounted on one bobbin; the needles are flat oblong plates from the same piece of steel, and magnetised in one piece; they are mounted on a pivot turning in an agate cup. The several parts of the apparatus are mutually adapted to each other; and in using it the galvanometer is not joined to the pile till the latter has been exposed to the heat, so as to prevent the current generated abstracting heat from the hot side. As made by Mr. Browning, the pile consists of a pair of elements $\frac{1}{2}$ in. long, the copper connections being circular plates $\frac{1}{100}$ in. thick and $\frac{5}{8}$ in. diameter. The pile is supported by thick copper terminals above the galvanometer, which consists of a copper ribbon making some twenty turns round a pair of astatic needles 1in. long and $\frac{1}{8}$ in. broad, pivoted in an agate cup. A contact-key is placed on one side, and the whole is inclosed in a glass shade perforated opposite the pile. A glass cone protects the front from extraneous heat, and a glass case the back. A directing magnet is fixed above the pile. Contact between the galvanometer and pile is made after (say) 30 seconds' exposure to the heat. The pile is affected by a person standing six feet from it, and the radiation from stellar space is evident in clear weather. Half a minute is sufficient to put the instrument ready for use.—Mr. Ridout also exhibited laboratory experiments showing cohesion in mercury by causing it to overflow up an inclined trough; electrolysis of water by a single Grove or bichromate cell, through diminishing the pressure in the flask containing the water by boiling it and condensing the vapour on cooling; a differential thermometer showing absorption of heat on liquefying solids; and the production of musical notes in glass tubes by contracting the bore smoothly to about $\frac{1}{4}$ of the diameter at one part. Prof. Foster remarked that the cohesion experiment might show the surface-tension. Prof. Guthrie and Prof. Hughes offered remarks on the electrolytic experiment, the latter stating that he finds the resistance of an iron cell he has constructed to depend on the electrodes rather than the liquid; when the negative plate is tempered iron the resistance is low, when soft iron it is high.—Prof. Stone exhibited photographs of König's new tonometer described by him at the last meeting, and further mentioned that König had devised a thermometer based on the principle that changes of temperature produce corresponding changes in the vibration rate of a tuning-fork. The temperature is found from the rate of the fork by bringing it to a zero rate by means of a rider.—Prof. Michin then described his experiment to solve the problem of transmitting light by photo-electric action. Two years ago he conceived the idea of employing for this purpose the fact that light falling on a sensitised silver plate disengages electricity. He forms a sensitive cell composed of two silver plates immersed in a conducting solution; one plate is coated with a sensitive emulsion of chloride or bromide of silver. When chloride is used, a solution of salt in water forms the liquid; when bromide, a solution of bromide of potash. A current is set up in the cell even in the dark, but when exposed to the magnesium light the current is very powerful, and flows within the cell from the uncoated to the sensitised plate. Prof. Michin also conducted this current by wire to a second cell in a dark chamber, and found that it effected a decomposition of the sensitive plate in that cell, as shown by a distinct darkening of the plate when "developed" by pyrogallic acid. The same effect was produced whether the current was reversed or not. Prof. Michin is continuing his experiments, and has provided a cable containing a number of separate conductors insulated from each other, in order to convey the currents from several cells. Prof. Perry feared that the effect would not be strong enough; but Prof. Michin said the light of a match produced a decided photo-electric effect in the cell. Prof. Perry alluded to the selenium plan proposed by himself and Prof. Ayrton, and said that Mr. Willoughby Smith had observed selenium to be sensitive to the shadow of a flying swallow. Prof. Adams testified to the sensitiveness of selenium and its power of being directly excited by light, a fact first proved by the experiments of Mr. Day and himself.

Entomological Society, April 7.—H. T. Stainton, F.R.S., vice-president, in the chair.—Messrs. G. C. Bignell, W. D. Cansdale, Frank Crisp, and the Rev. W. Fowler, were elected Ordinary Members, and M. E. André a Foreign Member.—Mr. J. T. Carrington exhibited a pale variety of *Arctia caja* which was bred by a gentleman at Croydon, who had been experimenting upon the effects of the rays of light transmitted through glasses of various colours upon this species. The specimen exhibited had been reared under green glass, but there was no evidence to show that the variation was due to the green rays.—The Secretary read a communication from Mr. Rothney, of Calcutta, on insects destroyed by flowers, with reference to a note on this subject published in the *Proceedings* of last year by Mr. J. W. Slater.—The following papers were read:—Notes on the coloration and development of insects, by Peter Cameron; on two gynandromorphous specimens of *Cirrochroa aoris*, Dbl., an Indian species of mymphalideous butterflies; and on *Cetonia aurata* and *Protactia bensoni*, by Prof. Westwood. Specimens and drawings were exhibited in illustration of the last paper, showing the specific distinctness of the insects in question.

Meteorological Society, April 21.—Mr. G. J. Symons, F.R.S., president, in the chair.—Rev. J. O. Bevan, M.A., F. E. Cobb, E. Filliter, F.G.S., T. L. Gentles, W. A. Harrison, F.R.G.S., J. W. Peggs, F. Slade, and E. J. C. Smith, were elected Fellows of the Society.—The discussion on Mr. Ellis's paper, on the Greenwich sunshine records, 1876-80, was resumed and concluded.—The following papers were read:—On the rate at which barometric changes traverse the British Isles, by G. M. Whipple, B.Sc., F.R.A.S., F.M.S.—A new form of Six's self-registering thermometer, by J. W. Zambra, F.M.S.

EDINBURGH

Royal Society, April 5.—Sir Wyville Thomson, vice-president, in the chair.—Mr. John Murray, of the *Challenger* Expedition, occupied the evening with an interesting and exhaustive paper on the structure and mode of origin of coral reefs and islands. After detailing the well-known and widely-accepted theory of Darwin, Mr. Murray proceeded to take exception to its general truth, and to substitute a new theory, which, in the light of the recent discoveries of the *Challenger* Expedition, appeared at once simpler and more consistent with the facts. The main features of this theory were as follows: The abundant pelagic life of the ocean was stated to be the chief food of the reef-building corals and of the deep-sea animals. Lime-secreting creatures were especially abundant in tropical oceanic waters. Tow-net experiments showed that in a cubic mass of the ocean one mile square by 100 fathoms, there were about sixteen tons of carbonate of lime in the form of calcareous Algæ, Foraminifera, pelagic Molluscs, &c. Although so abundant on or near the surface the dead shells of these organisms were quite absent from by far the greater part of the floor of the ocean. In all the greater depths they were removed during their fall or shortly after reaching the bottom by the action of carbonic acid, which was especially abundant in deep sea water. Other things being equal, they were found at greater depths where they were most abundant at the surface. On submarine elevations (which were probably all of volcanic origin) these dead shells were met with in great abundance: when the depth was less than a mile the shells and skeletons of almost every surface creature were present in the deposit. Mixed up with these we had in these deposits the shells and skeletons of deep-sea animals, as Echinoderms, Annelids, Polyzoa, Foraminifera, Corals, &c. In these more or less shallow depths the accumulation was relatively rapid, and the solvent action of sea water had consequently little effect. Eventually this bank reached near enough the surface to serve as a foundation for reef-building corals. As these corals built up to the surface those situated towards the outer margin of the coral plantation had a great advantage in the more abundant supply of food, and reached the surface first. If the coral-field or plantation were small (less than a square mile) the periphery was relatively large over which food came from the ocean, and from which detritus was carried to the interior; hence the interior was filled up and no lagoon was formed. The same was the case when the coral plantation was long and narrow. In larger coral-fields—the area increasing as the square and the periphery only in an arithmetic progression—the interior parts of the coral plantation were at a relatively great disadvantage, less food and less detritus for filling up were supplied per square mile, and in consequence a lagoon was formed. The carbonic acid in the sea water removed in solution the lime of the dead coral and coral rock from the lagoon. As the atoll extended seawards the lagoon was widened and deepened by the solvent and disintegrating power of the sea water. The structure of upraised coral atolls were referred to as confirming these views. Barrier reefs were explained on the same principles. Fringing reefs built seawards on a talus formed of their own *débris* and of surface shells and deep-sea shells and skeletons. A lagoon-channel was gradually formed by the solvent action of the sea water thrown over the reef at each tide. In this way the fringing reef became a barrier reef. Numerous sections of the reefs at Tahiti, from the survey of Lieut. Swire, of the *Challenger*, were exhibited. The structure of the interior overhanging reefs, and of the steep exterior submarine talus, were especially pointed out and explained. The chief features of barrier reefs and atolls were quite independent of subsidence, and would exist alike in stationary areas or in areas either of slow elevation or of slow subsidence. Throughout the volcanic islands of the great oceans the evidence of recent elevation was everywhere conspicuous, and the same was the case in regions of barrier reefs and atolls, as shown by Dana, Jukes, Couthouy, Semper, and others. He would expect to find local areas of subsidence in the great ocean basins on either side of volcanic islands and atolls, and this is what the soundings of the *Challenger* and *Tuscarora* seem to show. On the other hand the lines of volcanic islands and coral islands had probably always been the sites of a gradual elevation, for it must be remembered that these last have probably almost all a volcanic basis. In all cases the great agencies are the growth of the coral where most nourishment is to be had, and its death and disintegration by the action of the sea at those parts which cannot be, on account of their situation, sufficiently supplied with nourishment. In many cases, however, this disintegration, by breaking up the reef, serves to so alter conditions that decaying parts get a new lease of life, and growth begins afresh where decay was formerly manifest. Mr. Murray applied his theory with singular success to the discussion of particular cases of coral islands, such as the Maldive Islands, the Chagos Archipelago, and the great barrier reefs of Australia. The special merit of the theory is that it does away with the great and general subsidences which is the peculiar feature of Mr. Darwin's theory. Of such subsidences there is no other evidence. These views were also in harmony with Dana's as to the great antiquity of the ocean basins. In a previous paper he had shown that a study of deep-sea deposits also argued for the permanency and great antiquity of these great ocean depressions. The co-existence of fringing and barrier reefs and of atolls in close proximity (*e.g.* in the Fiji Islands), which is not easily explained by Darwin's theory, offers no difficulty whatever when looked at in the light of Mr. Murray's principles. In the criticism which followed, Sir Wyville Thomson and Prof. Geikie spoke in terms of high commendation of the thoroughness which characterised Mr. Murray's paper, and the success with which he had been able to do away with the assumption which was the basis of Darwin's theory, but for the truth of which there was no positive evidence.

PARIS

Academy of Sciences, April 26.—M. Edm. Becquerel in the chair.—The following papers were read:—On the inverse problem of the motion of a material point on a surface of revolution, by M. Resal.—On the law of distribution, according to altitude, of the substance in the atmosphere absorbing ultra-violet solar radiations, by M. Cornu. The identity of this law (which he is able to determine very definitely) with the barometric formula, shows that the absorption is exercised by the gaseous mass and not by aqueous vapour or dust, which leads to different progressions.—Study of the explosive properties of fulminate of mercury, by MM. Berthelot and Vieille. It is simply decomposed into carbonic oxide, nitrogen, and mercury. The authors furnish data of the heat liberated, the density, and the pressures developed in a closed vessel. The superior force of the fulminate is attributed to the almost instantaneous nature of its decomposition by simple inflammation, the almost total absence of dissociation of the products, and the great density of the matter.—On the cholera of fowls; studies of the conditions of non-recurrence of the malady, and some others of its characters, by M. Pasteur. The aliments suited to the life of the microbe in the fowl disappear in consequence of inoculation with attenuated virus.—Observations of Schaberle's comet at Marseilles Observatory, by M. Stephan.—On the meteorite which fell on May 10, 1879, near Estherville (Emmet Co., Iowa, U.S.), by Prof. J. Lawrence Smith. He thinks this meteorite should be placed apart for the phenomena of its fall, especially the force of penetration of its fragments into the ground, and for the mode of association of its mineral constituents.—On winter barley as forage, by MM. Pierre and Lemetayer. It is rather the abundance and precocity of this cereal which renders it in demand, than its richness in azotised matter.—On appointment of a scientific commission for the Panama scheme. M. de Lesseps specified documents he would give them. The work in hand came to this: 75,000,000 cubic metres to be excavated; 8,000 workmen for six years; 250 working days each year, or 1,500 days, during which 50,000 cubic metres should be done each day.—*Apropos* of M. Bouty's note on thermo-electric currents from a metal and a liquid, M. Du Moncel recalled former experiments by M. Hellesen and himself.—Some considerations in support of a note of March 29 on the impossibility of supposing in general a function of velocities in every question of hydraulics where frictions have a notable *rôle*, by M. Boussinesq.—On the dependence of two electromagnetic gyroscopes submitted to the same circuit of induction, by M. de Fonvielle. The velocity of each movable piece is diminished.—The death of M. de Luca was announced.—The surface of the wave considered as a limiting surface, by M. Mannheim.—On the numerical calculation of definite integrals, by M. Baillard.—On simultaneous linear equations and on a class of non-plane curves, by M. Picard.—On the series F_3 $(\alpha, \alpha', \beta, \beta', \gamma, x, y)$, by M. Appell.—Influence of temperature on the duration of period of a tuning-fork, by M. Mercadier. He corrects a numerical mistake in his memoir as quoted by Wiedemann (with whom he is in agreement).—On the theory of induction-currents, by M. Mascart.—On an experimental method fitted to determine the lines of surface in stationary flow of electricity through conducting surfaces, by M. Guébhard. At a short distance from a thin plate of metal in a mixed solution of acetate of lead and acetate of copper, are held the free ends of two conductors connected with a pile; thus a double system of Nobili's rings is produced of remarkable constancy and regularity, and in relation to the positions of the electrodes and the contour of the conducting surface.—Absolute measurement of Peltier's phenomenon on contact of a metal and its solution, by M. Bouty.—Measurement of the difference of potential of two metals in contact, by M. Pellat. The method (which has precision exceeding $\frac{1}{600}$ Daniell) is one of compensation, and its principle is, that if two metals, A and B, are connected by a metallic wire they take the same difference of potential as if they had been put directly in contact. The author studies the effects of varied surfaces of metals, change of temperature, and influence of gases round the plates.—On the theory of double circular refraction, by M. 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